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Corrigendum to 'Mixing, Communication Complexity and Conjectures of Gowers and Viola'

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In my paper [1], a normalization factor of $|G|^{-1}$ was missing in the statements of Theorem 2.4, Theorem 2.6 and Corollary 2.7. The correct formulation of these results is as follows.

Theorem 2.4. *Let G be a finite simple group of Lie type of rank r over a field with q elements.*

(i) *There is a constant $c > 0$ depending only on r, such that, if x, y are distributed uniformly over G (but may be dependent), then*

$$\|p_{x,y}\|_2^2 \leqslant |G|^{-1}(1 + |G|^{-c})$$

holds with probability at least $1 - |G|^{-c}$.

(ii) *There is an absolute constant $c > 0$ and a constant c' depending only on r, such that, if $G \notin S$, where*

$$S = \{L_2(q), L_3^{\pm}(q), L_4^{\pm}(q), D_4^{\pm}(q), D_5^{\pm}(q)\},$$

and x, y are distributed uniformly over G (but may be dependent), then

$$\|p_{x,y}\|_2^2 \leqslant |G|^{-1}(1 + c'q^{-(2r-1)})$$

holds with probability at least $1 - c/q$.

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Theorem 2.6. *Let G be a finite simple group. Let x, y be distributed uniformly over G (but they may be dependent). Fix s with $s > 0$.*

(i) *If $G = A_n$, then for some absolute constant c the probability that*

$$\|p_{x,y}\|_2^2 \leqslant |G|^{-1}(1 + cn^{-(2-2s)})$$

is at least $1 - cn^{-s}$.

(ii) *If G is a finite simple group of Lie type of rank r over the field with q elements, then the probability that*

$$\|p_{x,y}\|_2^2 \leqslant |G|^{-1}(1 + q^{-(2-2s-\epsilon)r})$$

is at least $1 - q^{-(s-\epsilon)r}$, for any $\epsilon > 0$ and $r \geqslant r(s, \epsilon)$.

Corollary 2.7. *Let G be a finite simple group. Let x, y be distributed uniformly over G (but they may be dependent).*

(i) *If $G = A_n$, then for any $\epsilon > 0$ there exists $n(\epsilon)$ such that, for any $n \geqslant n(\epsilon)$, the probability that*

$$\|p_{x,y}\|_2^2 \leqslant |G|^{-1}(1 + n^{-(2-\epsilon)})$$

is at least $1 - n^{-\epsilon/3}$.

(ii) *If G is a finite simple group of Lie type of rank r over the field with q elements, then the probability that*

$$\|p_{x,y}\|_2^2 \leqslant |G|^{-1}(1 + q^{-(2-\epsilon)r})$$

is at least $1 - q^{-\epsilon r/3}$, for any $\epsilon > 0$ and $r \geqslant r(\epsilon)$.

Consequently, the quotation of part (ii) above in the Introduction should change accordingly. No changes whatsoever are required in the proofs.

Reference

[1] Shalev, A. (2017) Mixing, communication complexity and conjectures of Gowers and Viola. *Combin. Probab. Comput.* **26** 628–640.

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